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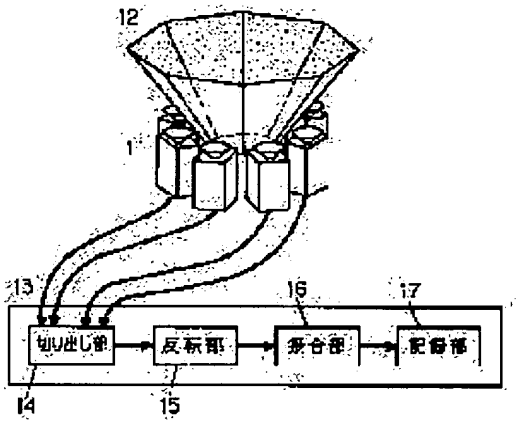
(71)Applicant : MATSUSHITA ELECTRIC IND CO LTD

(72)Inventor : YOSHIZAWA MASABUMI

(54) OMNIAZIMUTH PHOTOGRAPHING DEVICE AND OMNIAZIMUTH IMAGE SYNTHESIZER

(57)Abstract:

PURPOSE: To provide a panorama image of high resolution and matched view point by dividing the periphery of the photographing device into plural directions, reflecting the images in the respective directions on a planar mirror and photographing those images with correspondent cameras.



CONSTITUTION: This device is provided with a camera part 11 for which plural cameras are arranged on a circumference at equal intervals and the optical axes of all the cameras are matched with the normal direction of a circumferential plane where the cameras are arranged, regular polygonal corn shaped reflection mirror 12 joining plural planar mirrors paired with the respective cameras toward the outside, and image synthesizer 13. Then, the camera part and the reflection mirror are arranged so that the central axis of the camera part 11 can be matched with that of the reflection mirror 12, the apex direction of the reflection mirror 12 can be opposite to the photographing direction of the camera part 11 and a virtual image formed by the planar mirrors at the lens centers of cameras comes onto the central axis of the reflection mirror 12, and reflected images photographed on the planar mirrors by the cameras are joined by the image synthesizer 13.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the photography equipment of the panorama image which photoed the omnidirection.
[0002]
[Description of the Prior Art] Conventionally, as an approach of photoing the panorama image of the perimeter at once by making one certain point of space into a view, there is a thing as shown, for example in MRIU'94IIpp.151-158.
[0003] Drawing 5 is the block diagram of this conventional equipment, 51 is a photography camera and 52 is the mirror of a hyperboloid form. It arranges so that may **** the mirror of a hyperboloid form downward [vertical], a camera may be made into vertical facing up, and the shaft of a hyperboloid and the optical axis of a camera may be in agreement and the core of the lens of a camera may become the focus of a hyperboloid, and the location of a duality. By photoing the image which reflected in the mirror and carried out incidence to the camera, the image of the side and a lower part is photoed at once. Amendment processing is performed to the photoed image and it changes into the image obtained when a view is kept in the location of the focus of a hyperboloid.
[0004]
[Problem(s) to be Solved by the Invention] However, by the above technique, it had the technical problem that resolution fell to it very much compared with the image which photoed the one direction with the camera ordinarily since the sight of all the directions of a perimeter is copied in the image of one sheet.
[0005]
[Means for Solving the Problem] The camera section which this invention arranged two or more cameras in at equal intervals on the periphery, and made the optical axis of all cameras in agreement in the direction of a normal of the periphery side which put the camera in order, The reflecting mirror of forward multiple coning which joined outward each camera and two or more plane mirrors which make a pair While said reflecting mirror is in the lens side of said camera section, the shaft which turned to the direction of a normal through the core of the periphery of said camera section, and the medial axis of said reflecting mirror are in agreement and the bearing of the exposure axis of said camera section and the direction of top-most vertices.of said reflecting mirror are reverse sense In each group of said camera which makes a pair, and said plane mirror, the flat surface which passes along the optical axis of said camera and the medial axis of said reflecting mirror bisects one of the bases of said reflecting mirror. It is omnidirection photography equipment which arranges as the virtual image based on [of said camera by said plane mirror] lenses is on the medial axis of said reflecting mirror, and photos the reflected image of said plane mirror with said camera.
[0006]
[Function] The resolution of the image of each direction is maintained at the image and EQC of the usual camera photography by taking a photograph with the camera which divide the perimeter of

photography equipment in the direction of plurality, and a plane mirror is made to reflect the image of each direction, and corresponds.
[0007] Moreover, the image of the perimeter enclosure whose view corresponded is obtained by arranging a plane mirror to forward multiple coning, and making the virtual image based on [of each camera] lenses in agreement by one point of space.
[0008] Moreover, panorama image data is obtained by connecting the photoed image data.
[0009] Moreover, the dynamic image of an omnidirection is obtained by taking a photograph to coincidence by two or more sets of video cameras.
[0010] Moreover, the panorama image of only the required range is obtained by taking a photograph with the camera which divide a part of perimeter of photography equipment in the direction of plurality, and a plane mirror is made to reflect the image of each direction, and corresponds.
[0011]
[Example] Drawing 1 is the block diagram of the omnidirection photography equipment in the 1st example of this invention, and an omnidirection image synthesizer unit. As for the camera section and 12, in drawing 1 , 11 is [a reflecting mirror and 13] image recording equipment. Hereafter, the actuation is explained.
[0012] The camera section 11 arranges two or more cameras in on a periphery to vertical facing up. As long as this camera can output a still picture, what kind of thing is sufficient as it. A reflecting mirror 12 consists of plane mirrors of the same number as the number of the camera of the camera section 11, and makes one pair with one set of a camera, and the plane mirror of one sheet. Each camera which constitutes the camera section 11 photos the sight of the perimeter reflected in the corresponding plane mirror. The photoed image is sent to a recording device 13, joins all images and records them as a panorama image there.
[0013] Drawing 2 shows the physical relationship of a reflecting mirror and a camera. (a) is drawing which looked at the whole reflecting mirror which combined two or more plane mirrors from the vertical upper part, and 20 is the plane mirror of one sheet. (b) shows the physical relationship seen from [of the flat surface passing through the lens core of the vertical axis of a reflecting mirror, and a camera] the normal about the plane mirror and camera of a lot, 21 is a lens and 22 is a plane mirror. (c) is drawing which looked at the reflecting mirror from the horizontal direction, as the plane mirror of one sheet comes to a transverse plane.
[0014] (a) is explained first. If all the cameras used for photography are of the same kind and the horizontal field angle is set to phi x, they will arrange a camera so that it may be include-angle thetan which is theta n<phi x and the division-into-equal-parts rate of the periphery centering on a certain vertical axis may be carried out. At this time, a camera is arranged so that equally to the direction of a normal of the periphery side where the perpendicular direction of vertical facing up and an image side put the camera in order for the optical axis of each camera. The radius of the circle [core / of the arranged camera group / lens] centering on an epilogue vertical axis is set to d. Thus, it arranges so that the flat surface which passes along the optical axis and vertical axis of the camera with which it is [vertical facing down] equal to the vertical axis to which the shaft has arranged the camera, and each plane mirror corresponds the reflecting mirror which carried out the form where the plane mirror of the number of a camera and the same number was made to rival outward on the side face of a forward multiple drill above the arranged camera group by the bisector of the vertical angle may be crossed. What is necessary is just to create this reflecting mirror to below how, and the count approach of that parameter is stated to it.
[0015] Next, (b) is explained. If it sees from [of the flat surface which passes along a vertical axis and the optical axis of a camera about the camera and plane mirror of a lot] a normal, a plane mirror will serve as a straight line. When making into Point Q the point that the optical axis of the camera which passes along Point P and Point P intersects a plane mirror in the core of a lens, The virtual image according an angle of inclination [as opposed to the vertical axis of h and a plane mirror for the distance of Point P and Point Q] to the plane mirror of thetam and Point P Point P', a camera -- a perpendicular direction -- a field angle -- phi -- y -- a point -- P -- ' -- a point -- Q -- connecting -- a segment -- a

horizontal direction -- making -- an angle -- theta -- y -- ** -- carrying out -- optical -- relation -- from -- a plane mirror -- reflecting -- a point -- P -- incidence -- carrying out -- light -- a point -- P -- a virtual image -- it is -- a point -- P -- ' -- a plane mirror -- there is nothing -- a case -- incidence -- carrying out -- light -- being equal . The image photoed with the camera arranged from this as shown in (b) is equal to the image photoed with the imagination camera arranged so that in parallel with the flat surface at which have a lens core in point P', and an optical axis is equal to P'Q, and the perpendicular direction of an image side passes along a vertical axis and a lens core. However, the image reversed horizontally is obtained with the property of the reflection in a mirror.

[0016] Whether horizontally, the elevation angle of which is given and the perimeter of a vertical axis is photoed is the matter as which it is determined beforehand what kind of image is needed. This is equal to elevation angle thetay of the virtual camera which has a lens core in point P'. Therefore, thetay is beforehand specified according to the condition of the image to need.

[0017] Here, angle-of-inclination thetam to the vertical axis of a plane mirror is thetam= (pi/2-thetay)/2, and is calculated from elevation angle thetay decided in order to photo an image needed.

[0018] If virtual-image point P' based on [which is acquired to the group of all cameras and plane mirrors] lenses is in agreement by one point of space, some images which looked around the perimeter by making one of them into a view can be photoed to each camera. If point P' is on the vertical axis of the periphery of the radius d which has arranged the camera as shown in (b), it can be made in agreement [by one point of space] from the object nature of equipment to all groups. Since a plane mirror intersects the flat surface and perpendicular containing the optical axis and vertical axis of a camera, point P' is always on this flat surface. Therefore, if the optical axis of a camera and the distance of point P' are equal to the radius of the periphery which has arranged the camera, point P' is always on a vertical axis. When the optical axis of a camera and the distance of point P' are kept fromfrom [d], since it is P'Q=PQ=h and <PQP'=2*thetam, it is d'=h*sin (2*thetam).

It comes out. Here, the radius d of a periphery is used for the lens core of a camera, and the distance h of a plane mirror, and it is h=d/sin (2*thetam).

Then, it is set to d'=d and point P' can be brought on a vertical axis.

[0019] Therefore, the distance h of a lens core and a plane mirror inclines to the radius d of a circle and the vertical axis of a plane mirror which have arranged the camera, and is determined from thetam.

[0020] By the way, if the field angle of the perpendicular direction of a camera is set to phiy, it will set with lu upward and the die length of the lengthwise direction of a plane mirror will be set with ld downward on the basis of Point Q, it will be lu>h*sin (phiy/2)/sin (thetam-phiy/2), respectively.

ld>h*sin (phiy/2)/sin (thetam+phiy/2)

By securing ****, it becomes possible to make it the image which reflected in the plane mirror all the images of the perpendicularly a photograph is taken with a camera.

[0021] Moreover, although it is drawing seen point P' of (b), and from [of the straight line which connects Point Q] the normal, for the horizontal die length of a plane mirror, the surface and a base are [(c)] lt=2 d*tan(thetam/2)+2 lu*sin (thetam) tan (thetam/2), respectively.

lb=2 d*tan(thetam/2)-2 ld*sin tan (thetam/2) (thetam)

It becomes.

[0022] If the elevation angle of an image to photo is decided to two or more cameras arranged in on the cylinder of a radius d as stated above, the required inclination of a reflecting mirror and magnitude, and the distance from a camera can be found, and if the reflecting mirror is used, the division image of the perimeter enclosure whose view corresponded can be obtained.

[0023] Two or more cameras of the camera section 11 take a photograph to coincidence, and the data of the photoed image are sent to the omnidirection image synthesizer unit 13. Here, first, the logging section 14 removes the part of the unnecessary image reflected in the next plane mirror reflected to the edge on either side in each image, and starts only the part of the mirror image reflected in the center. Next, the pars inflexa 15 performs horizontal reversal to each image, and changes a mirror image into a normal image. Next, to the image data which the pars inflexa 15 outputs, a joint 16 connects the image data obtained from the camera which adjoined in the clockwise direction, when the camera section is

seen from an optical axis as image data of the right to the image obtained from one certain camera. It connects to the image data obtained from all cameras until it connects the image data obtained from the camera which adjoined in the counterclockwise direction [of the camera] on the basis of one certain camera. The Records Department 17 records the connected data and an output is equipped with them.
[0024] According to this example, an omnidirection image with resolution equivalent to the usual photography can be obtained as mentioned above by using the photography equipment which carried out the above configurations, and a synthesizer unit.
[0025] In addition, although this example explained the optical axis of a camera as vertical facing up, this photography equipment may turn to any direction, and the omnidirection image of a direction perpendicular to the optical axis of a camera is obtained in that case.
[0026] In addition, although a camera shall output a still picture in this example, what can output animations, such as a video camera and a TV camera, may be used, and the dynamic image of the perimeter is obtained by connecting the image photoed at this time of day to the time series image of the direction of plurality acquired in that case.
[0027] Drawing 3 is the block diagram of the photography equipment in the 2nd example of this invention, and an image synthesizer unit. As for the camera section and 32, in drawing 3 , 31 is [a reflecting mirror and 33] image recording equipment. Hereafter, the actuation is explained.
[0028] The camera section 31 makes two or more cameras vertical facing up, and arranges them in on radii. As long as this camera can output a still picture, what kind of thing is sufficient as it. A reflecting mirror 32 consists of plane mirrors of the same number as the number of the camera of the camera section 31, and makes one pair with one set of a camera, and the plane mirror of one sheet. Each camera which constitutes the camera section 31 photos the sight of the perimeter reflected in the corresponding plane mirror. The photoed image is sent to a recording device 33, joins all images and records them as a panorama image there.
[0029] Drawing 4 shows the physical relationship of a reflecting mirror and a camera. (a) is drawing which looked at the whole reflecting mirror which combined two or more plane mirrors from the vertical upper part, and 40 is the plane mirror of one sheet. (b) shows the physical relationship seen from [of the flat surface passing through the lens core of the vertical axis of a reflecting mirror, and a camera] the normal about the plane mirror and camera of a lot, 41 is a lens and 40 is a plane mirror. (c) is drawing which looked at the reflecting mirror from the horizontal direction, as the plane mirror of one sheet comes to a transverse plane.
[0030] (a) is explained first. All the cameras used for photography are of the same kind, and set the horizontal field angle to phi x. If the direction to photo has the include angle of thetah horizontally, two or more cameras are arranged so that the core of a camera lens may come on the middle point of the arc of each fanning which a central angle carries out the division-into-equal-parts rate of the central angle by thetah and include-angle thetan which is theta n<phi x to fanning it is [fanning] a radius d, and is made. d is a suitable constant here. At this time, a camera is arranged so that equally to the direction of a normal of radii in which the perpendicular direction of vertical facing up and an image side put the camera in order for the optical axis of each camera. Let the vertical axis passing through the core of fanning which has arranged the camera be the medial axis of the camera section.
[0031] combination of the same number of sheets as the number of a camera -- right and left -- a plane mirror with a trapezoid object configuration is joined in order of oblique sides, and it considers as the reflecting mirror which carried out the form where it was made to rival on some side faces of an imagination cone. The edge of a reflecting mirror is not closed at this time. Moreover, it joins so that the mirror plane of each plane mirror may come to a conic outside.
[0032] Downward [vertical], the top-most vertices of a virtual cone are arranged for this reflecting mirror so that it may become equal to the medial axis of the camera section about a medial axis. At this time, it arranges so that an intersection, and the flat surface and plane mirror of a parenthesis may cross perpendicularly by perpendicular 2 bisectrix of the surface of a flat surface and each plane mirror which passes along the optical axis and medial axis of the camera with which each plane mirror corresponds.
[0033] What is necessary is just to create this reflecting mirror to below how concretely, and the count

approach of that parameter is stated to it.
[0034] Next, (b) is explained. If it sees from [of the flat surface which passes along a vertical axis and the optical axis of a camera about the camera and plane mirror of a lot] a normal, a plane mirror will serve as a straight line. When making into Point Q the point that the optical axis of the camera which passes along Point P and Point P intersects a plane mirror in the core of a lens, The virtual image according an angle of inclination [as opposed to the vertical axis of h and a plane mirror for the distance of Point P and Point Q] to the plane mirror of thetam and Point P Point P', a camera -- a perpendicular direction -- a field angle -- phi -- y -- a point -- P -- ' -- a point -- Q -- connecting -- a segment -- a horizontal direction -- making -- an angle -- theta -- y -- ** -- carrying out -- optical -- relation -- from -- a plane mirror -- reflecting -- a point -- P -- incidence -- carrying out -- light -- a point -- P -- a virtual image -- it is -- a point -- P -- ' -- a plane mirror -- there is nothing -- a case -- incidence -- carrying out -- light -- being equal . The image photoed with the camera arranged from this as shown in (b) is equal to the image photoed with the imagination camera arranged so that in parallel with the flat surface at which have a lens core in point P', and an optical axis is equal to P'Q, and the perpendicular direction of an image side passes along a vertical axis and a lens core. However, the image reversed horizontally is obtained with the property of the reflection in a mirror.
[0035] Whether horizontally, the elevation angle of which is given and the perimeter of a vertical axis is photoed is the matter as which it is determined beforehand what kind of image is needed. This is equal to elevation angle thetay of the virtual camera which has a lens core in point P'. Therefore, thetay is beforehand specified according to the condition of the image to need.
[0036] Here, angle-of-inclination thetam to the vertical axis of a plane mirror is thetam= (pi/2-thetay)/2, and is calculated from elevation angle thetay specified in order to photo an image needed.
[0037] If virtual-image point P' based on [which is acquired to the group of all cameras and plane mirrors] lenses is in agreement by one point of space, some images which looked around the perimeter by making one of them into a view can be photoed to each camera. If point P' is on the medial axis of the radii of the radius d which has arranged the camera as shown in (b), it can be made in agreement [by one point of space] from the object nature of equipment to all groups. Since a plane mirror intersects the flat surface and perpendicular containing the optical axis and medial axis of a camera, point P' is always on this flat surface. Therefore, if the optical axis of a camera and the distance of point P' are equal to the radius of the radii which have arranged the camera, point P' is always on a medial axis. When the optical axis of a camera and the distance of point P' are kept fromfrom [d], since it is P'Q=PQ=h and <PQP'=2*thetam, it is d'=h*sin (2*thetam).
It comes out. Here, the radius d of radii is used for the lens core of a camera, and the distance h of a plane mirror, and it is h=d/sin (2*thetam).
Then, it is set to d'=d and point P' can be brought on a medial axis.
[0038] Therefore, the distance h of a lens core and a plane mirror inclines to the radius d of a circle and the medial axis of a plane mirror which have arranged the camera, and is determined from thetam. By the way, if the field angle of the perpendicular direction of a camera is set to phiy, it will set with lu upward and the die length of the lengthwise direction of a plane mirror will be set with ld downward on the basis of Point Q, it will be lu>h*sin (phiy/2)/sin (thetam-phiy/2), respectively.
ld>h*sin (phiy/2)/sin (thetam+phiy/2)
By securing ****, it becomes possible to make it the image which reflected in the plane mirror all the images of the perpendicularly a photograph is taken with a camera.
[0039] Moreover, although it is drawing seen point P' of (b), and from [of the straight line which connects Point Q] the normal, for the horizontal die length of a plane mirror, the surface and a base are [(c)] lt=2 d*tan(thetam/2)+2 lu*sin (thetam) tan (thetam/2), respectively.
lb=2 d*tan(thetam/2)-2 ld*sin tan (thetam/2) (thetam)
It becomes.
[0040] If the elevation angle of an image to photo is decided to two or more cameras arranged in on the radii of a radius d as stated above, the required inclination of a reflecting mirror and magnitude, and the distance from a camera can be found, and if the reflecting mirror is used, the division image of the

perimeter whose view corresponded can be obtained.
[0041] Two or more cameras of the camera section 31 take a photograph to coincidence, and the data of the photoed image are sent to the image synthesizer unit 33. Here, first, the logging section 34 removes the part of the unnecessary image reflected in the next plane mirror reflected to the edge on either side in each image, and starts only the part of the mirror image reflected in the center. Next, the pars inflexa 35 performs horizontal reversal to each image, and changes a mirror image into a normal image. Next, a joint 36 connects the image data obtained from the camera which adjoined in the clockwise direction in order with the order by which the camera has been arranged as image data of the right to the image data which the pars inflexa 35 outputs to the image obtained from the camera which sees from a medial axis and is in a left end. The Records Department 37 records the connected data and an output is equipped with them.
[0042] As mentioned above, according to this example, by using the photography equipment which carried out the above configurations, and a synthesizer unit, it can have resolution equivalent to the usual photography, and the required image of only a size can be obtained.
[0043] In addition, although this example explained the optical axis of a camera as vertical facing up, this photography equipment may turn to any direction, and the image of a direction perpendicular to the optical axis of a camera is obtained in that case.
[0044] In addition, although a camera shall output a still picture in this example, what can output animations, such as a video camera and a TV camera, may be used, and a dynamic image is obtained by connecting the image photoed at this time of day to the time series image of the direction of plurality acquired in that case.
[0045]
[Effect of the Invention] Since according to this invention the panorama image whose view resolution is high and corresponded by using two or more cameras can be obtained and a user can be provided with an image with much amount of information, the practical effectiveness is large.
[0046] Moreover, since a panorama dynamic image can be obtained by using two or more sets of video cameras according to this invention, the visual effectiveness is large.
[0047] Moreover, according to this invention, since only the required range around photography equipment can be photoed alternatively, the practical effectiveness is large.

[Translation done.]

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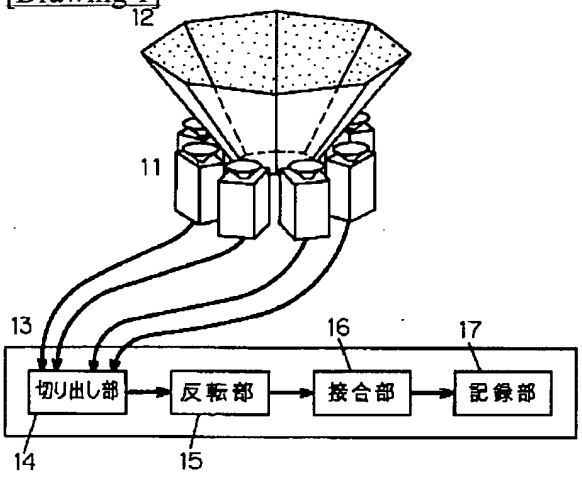
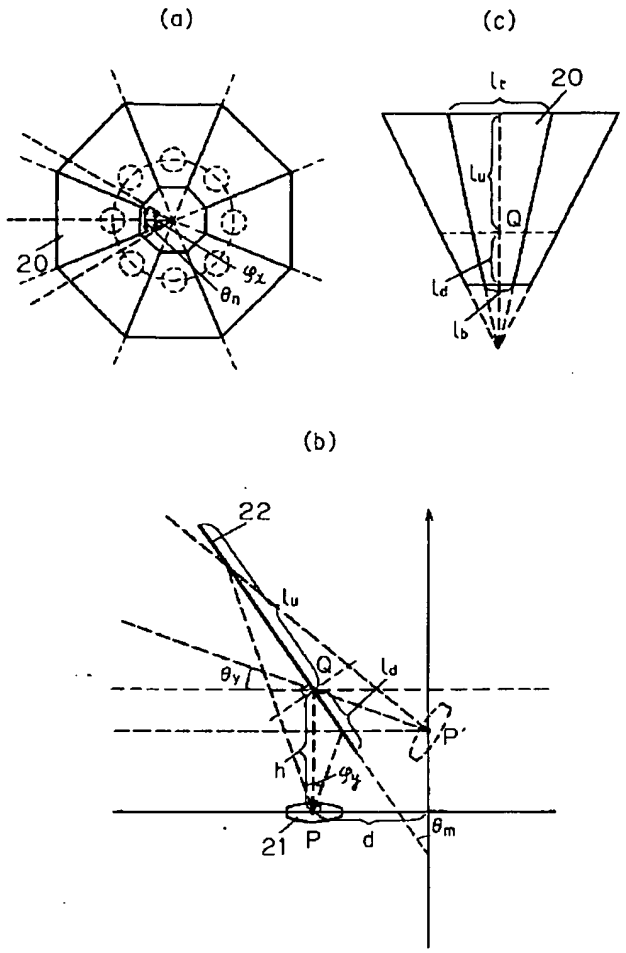
DRAWINGS

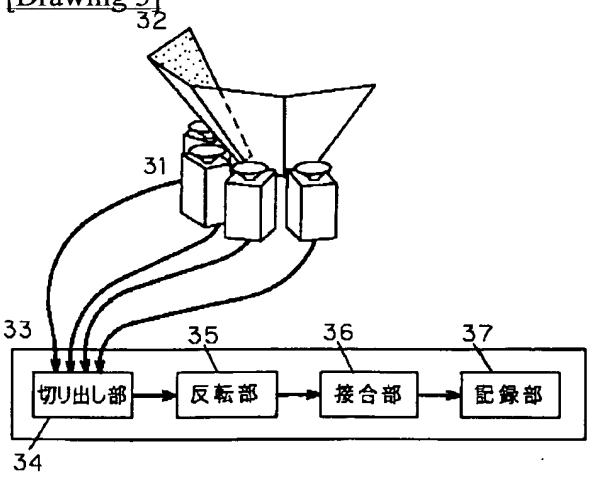
[Drawing 1]



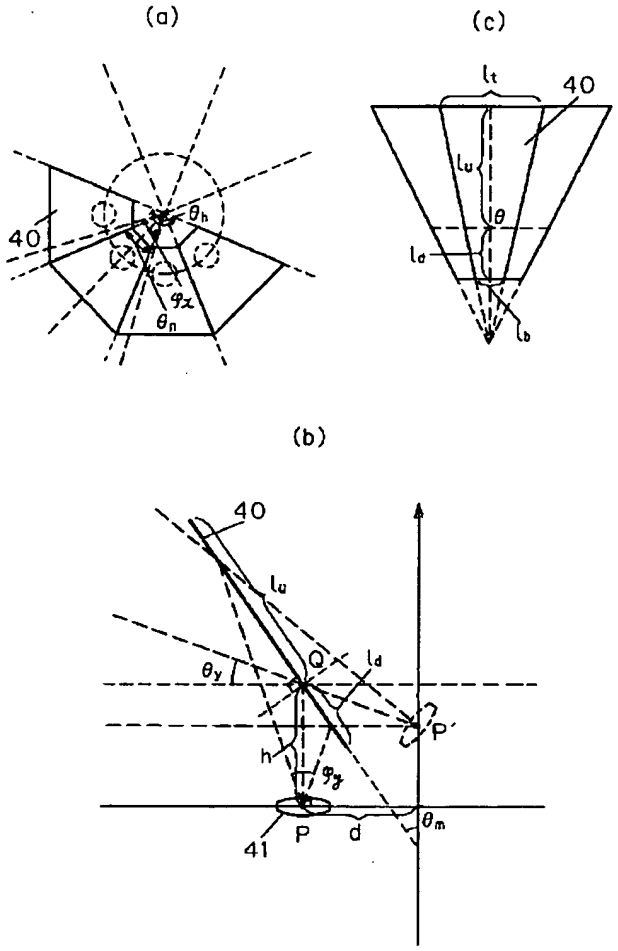
[Drawing 2]



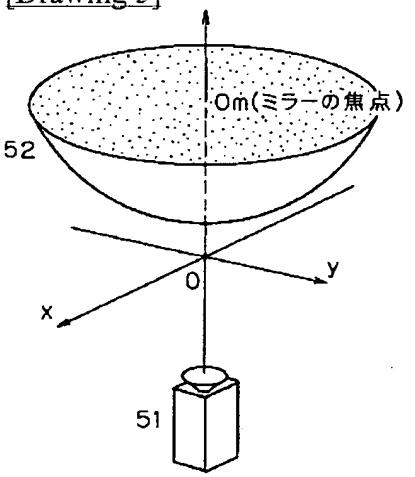
[Drawing 3]



[Drawing 4]



[Drawing 5]



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CLAIMS

[Claim(s)]
[Claim 1] The camera section which arranged two or more cameras in at equal intervals on the periphery, and made the optical axis of all cameras in agreement in the direction of a normal of the periphery side which put the camera in order, The reflecting mirror of forward multiple coning which joined outward each camera and two or more plane mirrors which make a pair is provided. While said reflecting mirror is in the lens side of said camera section, the shaft which turned to the direction of a normal through the core of the periphery of said camera section, and the medial axis of said reflecting mirror are in agreement and the bearing of the exposure axis of said camera section and the direction of top-most vertices of said reflecting mirror are reverse sense In each group of said camera which makes a pair, and said plane mirror, the flat surface which passes along the optical axis of said camera and the medial axis of said reflecting mirror bisects one of the bases of said reflecting mirror. Omnidirection photography equipment to which the virtual image based on [of said camera by said plane mirror] lenses is on the medial axis of said reflecting mirror, and photos the reflected image of said plane mirror with said camera.
[Claim 2] The logging section which cuts down the data of a mirror image part reflected to the center section from two or more image data photoed by omnidirection photography equipment according to claim 1, respectively, The pars inflexa which generates the data of the image which reversed the horizontal direction of a screen from the data of the mirror image part which said logging section started, The omnidirection image synthesizer unit equipped with the joint which joins the reverse image data which said pars inflexa generated from the image photoed with the adjoining camera, and the Records Department which records joined data.
[Claim 3] Omnidirection photography equipment according to claim 1 characterized by having arranged two or more sets of video cameras in at equal intervals for the camera section on the periphery, and replacing the optical axis of all video cameras in the camera section made in agreement in the direction of a normal of the periphery side which put the video camera in order.
[Claim 4] The logging section which cuts down the data of a mirror image part reflected to the center section from two or more time series image data photoed by omnidirection photography equipment according to claim 3, respectively, The pars inflexa which generates the data of the image which reversed the horizontal direction of a screen from the data of the mirror image part which said logging section started, The omnidirection image synthesizer unit equipped with the joint which joins the reverse image data which said pars inflexa generated from the image photoed with the camera which adjoined this time of day, and the Records Department which records joined data.
[Claim 5] The camera section which arranged two or more cameras in at equal intervals on the radii which make a part of periphery, and made the optical axis of all cameras in agreement in the direction of a normal of the periphery side which put the camera in order, The reflecting mirror which joined outward and made equal to the configuration of some side faces of a forward multiple drill each camera and two or more plane mirrors which make a pair is provided. While said reflecting mirror is in the lens side of said camera section, the shaft which turned to the direction of a normal through the core of the

radii of said camera section, and the medial axis of said reflecting mirror are in agreement and the mirror plane of said reflecting mirror turns to said camera section In each group of said camera which makes a pair, and said plane mirror ****** the optical axis of said camera, and the medial axis of the radii of said camera section to said plane mirror and perpendicular An intersection, Photography equipment to which the virtual image based on [of said camera by said plane mirror] lenses is on the medial axis of the radii of said camera section, and photos the reflected image of said plane mirror with said camera. [Claim 6] The logging section which cuts down the data of a mirror image part reflected to the center section from two or more image data photoed by photography equipment according to claim 5, respectively, The pars inflexa which generates the data of the image which reversed the horizontal direction of a screen from the data of the mirror image part which said logging section started, The image synthesizer unit which consists of a joint which joins the reverse image data which said pars inflexa generated from the image photoed with the adjoining camera, and the Records Department which records joined data.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block diagram of the omnidirection photography equipment in the 1st example of this invention, and an omnidirection image synthesizer unit
[Drawing 2] The plot plan of the reflecting mirror in the 1st example of this invention, and a camera
[Drawing 3] The block diagram of the photography equipment in the 2nd example of this invention, and an image synthesizer unit
[Drawing 4] The plot plan of the reflecting mirror in the 2nd example of this invention, and a camera
[Drawing 5] The block diagram of conventional omnidirection photography equipment
[Description of Notations]
11 Camera Section
12 Reflecting Mirror
13 Omnidirection Image Synthesizer Unit
14 Logging Section
15 Pars Inflexa
16 Joint
17 Records Department
20 Plane Mirror
21 Camera Lens

[Translation done.]